

Hi-Tech Institute of Engineering & Technology
DEPARTMENT OF ELECTRICAL ENGINEERING
Course-B.TECH 1ST YEAR
PAPER SET-2 (SEM-I)-ODD SEMESTER-2022-23

Subject Code: BEE101

Subject Name: FUNDAMENTALS OF ELECTRICAL ENGINEERING

FACULTY: Prof. (Dr.) VIVEK CHOPRA/Mr. OMKAR SINGH

Time: 3: 00 Hours

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION-A

1. Attempt all question in brief.

2x 7 = 14

Q.No	Question	Marks	CO
a.	Draw no load phasor diagram of a transformer.	2	3
b.	Explain (i) Ideal current source (ii) ideal voltage source.	2	1
c.	What is the use of form factor and peak factor?	2	2
d.	Define the term voltage regulation of a transformer.	2	3
e.	Two ac currents one represented as $i_1 = 25 \sin (314 t + 30^\circ)$ & $i_2 = 35 \sin (314 t + 45^\circ)$. Draw the phasor & show the resultant when they are connected in parallel.	2	2
f.	What is earthing & lightening protection?	2	5
g.	Define with examples: bilateral and unilateral elements.	2	1

SECTION-B

2. Attempt any three of the following:

7 x 3 = 21

Q.No	Question	Marks	CO
a.	Determine current in 5 ohm resistor by using mesh analysis in the circuit shown in figure below. <div style="text-align: center;"> <p>Fig.1</p> </div>	7	1
b.	Derive an expression of current in R-L-C series circuit with phasor diagram. Explain how this circuit takes active and reactive power?	7	2
c.	What is voltage Regulation in a single Phase Transformer? What should be its value for an ideal transformer?	7	3
d.	Derive the EMF equation of D.C. Generator. An 8 pole lap wound dc generator has 450 armature turns. It operates at 0.02 wb flux per pole and runs at 1000 rpm at no load. Find the emf induced by it.	7	4
e.	Derive the expression for resonant frequency & quality factor for an ac circuit under the condition of parallel resonance.	7	2

SECTION-C

3. Attempt any ONE part of the following:

1x7 = 7

Q.No	Question	Marks	CO
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a.	In a given R-L series circuit, $R=35\ \Omega$, and $L=0.1\text{H}$. if $220\angle 30^\circ$, 50 Hz supply is applied to the series circuit. Find i) Power Factor, ii). Active, Reactive & Total power.	7	2
b.	Explain in details B-H loop of magnetic materials.	7	3

4. Attempt any TWO part of the following:

2x7 = 14

Q.No	Question	Marks	CO
a.	Name the various cables used in electrical system based on insulation explain any two. What are the features of good conductor in electrical circuit?	7	5
b.	A 100 KVA, 6.6kV/230 V, 50 Hz transformer has 90% efficiency at 0.8 p.f lagging both at full load and half load. Determine iron and copper loss at full load.	7	3
c.	Determine current through 2 ohm resistance by node analysis.	7	1

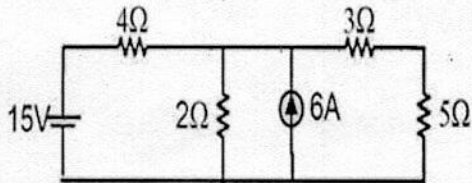


Fig.2

5. Attempt any ONE part of the following:

1x7 = 7

Q.No	Question	Marks	CO
a.	A series circuit consists of a resistance of $10\ \Omega$, and inductance of 50mH and a variable capacitance in series across a 100V, 50Hz supply. Calculate- i). The value of capacitance to produce resonance. ii). Voltage across the capacitance. iii). Q-factor.	7	2
b.	A 4-pole shunt generator with lap-connected armature has field and armature resistance of $50\ \Omega$ and $0.1\ \Omega$ respectively. If supplying power to 100W lamp load for 100 V. Calculate the armature current and the generated emf. Consider a contact drop of 1V per brush.	7	4

6. Attempt any ONE part of the following:

1x7 = 7

Q.No	Question	Marks	CO
a.	An AC sinusoidal current has rms value of 40A at 50 Hz frequency. Write expression for instantaneous current and obtain its value 0.002 sec after passing through maximum positive value.	7	3
b.	Draw the characteristics of battery.	7	5

7. Attempt any ONE part of the following:

1x7 = 7

Q.No	Question	Marks	CO
a.	Derive the relation between line current & phase current in case of three phase delta connected balanced load. Three identical coils of resistance $8\ \Omega$ and inductive reactance $6\ \Omega$ are connected in delta across 400V mains. Determine power, power factor and line current. Draw phasor diagram.	7	2
b.	What is the relation between frequencies of stator & rotor currents? A 3-phase, 50Hz induction motor has 6 poles and operates with a slip of 5% at a certain load. Determine i). The speed of rotor with respect to the stator. ii). The frequency of the rotor current. iii). The speed of the rotor magnetic field with respect to the stator.	7	4